



# MacroAir

engineers of air™

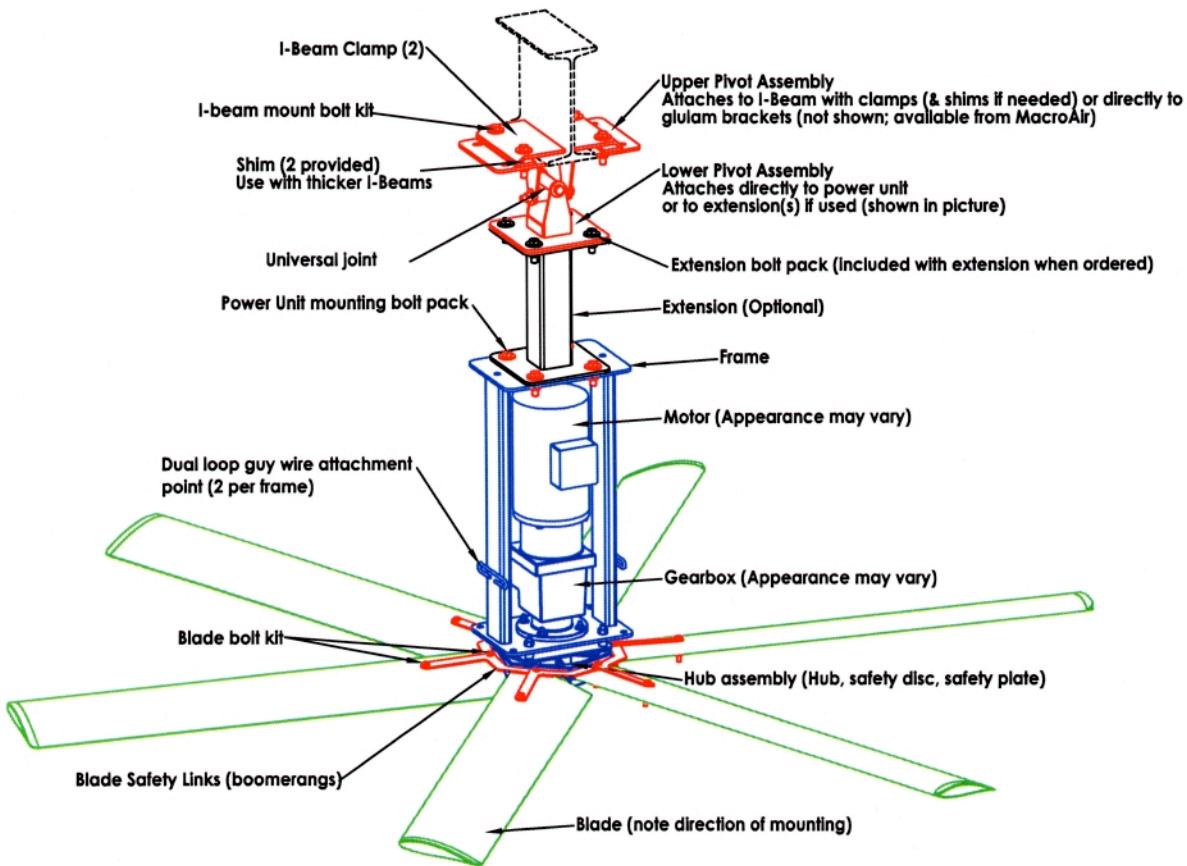
Installation Manual

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## Anatomy of a Fan



Items shown in red are packaged with the Universal Mounting Hardware Kit  
 Items shown in blue are factory-assembled as a complete Power Unit  
 Blade assemblies are shown in green  
 Items shown in black are included when an extension is ordered, along with longer safety cable and guy wires (2 feet per foot of drop)

Not shown, but included with Universal Mounting Hardware kit:  
 Guy wire (4 @ 15 feet standard)  
 Guy wire bolt kit  
 Safety cable (1 @ 15 feet standard)  
 Safety cable clamps (packaged with Power Unit mount bolt pack)

## Check Your Shipment, What's Included For 6 Blade Fans

*Note: Some models may vary slightly*

### Blade Carton (Blades)



### Power Unit Carton

Remote Control Box (where applicable)

Power Unit Carton



### Motor Control Panel with Variable Frequency Drive (where applicable)

Owner's Manual with Warranty Card

Installation Manual

### Gearbox Vent Cap (For Dodge Only)

### Power Unit (all preassembled)

Hybrid Hub with H Beam Blade Struts

Frame

Gearbox

Motor with J-Box

Safety System

### Universal Mounting Hardware

Swivel Mount Assembly

4 Guy Wire Cables 1/8 inch

Guy Wire Clamp Pack (includes tension tool)

Safety Cable 1/4 inch

Safety Cable Bolt Pack

Blade Bolt Pack

Mounting Hardware Bolt Pack

Extended Blade Safety Links

Clamps

Shims

## What You Need To Get Started

Scissor Lift

5/16 inch through 3/4 inch wrench and socket set

Phillips and standard screw drivers

Torque wrench

Call MacroAir at 866.668.3247 if you have any questions

## Check Your Shipment, What's Included For eco6 Guard Fan

### Motor Mount Assembly

Motor/gearbox, Hybrid Hub, and keyless bushing adapter attached to motor mount

If ordered without safety screens, the Hybrid hub cover, hub safety system, and blade struts will also be attached to the hub.

### Wall Mount Assembly

V-shaped (roughly) wall mount  
Pivot mount (attached to wall mount)

**If the fan is ordered with screens, the following will be in the box.**

Safety cable  
Safety cable bolt kit  
Blade bolt kit  
Keyless bushing adapter  
Bolts and washers to attach keyless bushing adapter to hub  
Packet of bolts, nuts, and washers to attach rear screen to motor mount  
Packet of large sheet metal screws to attach front screen to rear screen  
Hub cover  
Screws and star washers to attach hub cover  
Solid Steel Blade Struts  
Solid Steel Blade Struts to Hybrid Hub bolt pack

**If the fan is ordered without screens, the following will be in the box.**

Safety cable  
Safety cable bolt kit  
Blade bolt kit  
Blade safety links and safety link extenders

Variable speed models include a control panel, remote, remote wire, motor cable and cable glands (same as regular fan). Single speed models will have an AG Starter and AG Starter enclosure with instruction manual and warranty card loose rather than in the MCP box.

All the above is in the power unit crate.

If the fan is ordered with screens, they will be on a separate pallet.

Blades will be on a separate pallet.

Call MacroAir at 866.668.3247 if you have any questions



## Please Read this Important Information Before you Install Fans

- Make sure Power is OFF before beginning any installation or maintenance procedure.
- Refer to the enclosed packing list and verify that all fan components are included before you begin.

### 1.1 Key Safety System Components

MacroAir fans are engineered with key safety features to prevent pieces of the fan from falling in the unlikely event of a catastrophic failure. Used together, these systems and devices provide comprehensive protection of people, equipment, and property. Follow the detailed instructions precisely when installing fans, including the following:

Install safety cable and guy wires on every fan. Properly installed, the guy wires will keep the fan stable in case of earthquake or in "outdoor" installations where high wind conditions may occur. The safety cable, if installed per MacroAir specifications, will prevent the fan from falling in the unlikely event the mounting system should fail.

Install the complete set of extended blade safety links, which connect each blade to the adjacent blades and reinforce the area between the mounting holes. This is an important precautionary measure which will help prevent a blade from falling should one break off at the hub for any reason.

### 1.2 Placement and Spacing

Check the area where fans will be mounted to determine vertical and horizontal spatial clearances. A standard ceiling fan is mounted so the measurement from the bottom of the beam to the bottom of a fan's hub is 3 feet. Extensions may be ordered to lower the fan if needed. Ceiling fans should be mounted so the lowest part, the blades, are located at a minimum of 10 feet above the floor. If possible, avoid mounting fans directly below lights or skylights to avoid any strobe effect caused by moving blades. Note, a large fan, 20 - 24 feet in diameter, performs best at 20 to 30 feet above the floor, but acceptable performance has been demonstrated as low as 10 feet and as high as 50 feet.

If the building has a mezzanine, fans should be mounted so a person can not reach a fan in any way from the upper level/deck. Make certain fans are positioned so the blade tips are at least 3 feet away from any area where a person may be able to extend outward to reach them.

### 1.3 Fan Clearance

Note, fans must be far enough below the ceiling to allow proper air circulation — no closer than 15% of the fan diameter. Due to the design of our fans and mounting hardware, fan blades droop as much as a foot below the bottom of the hub when the fan is at rest. If required, extension mounts are available from the factory. For more information, refer to the "Fan Clearance and Extension Guide" on page 29.

### 1.4 Mark Floor to Alert Personnel

When mounting a fan in an area where materials may be elevated into its path, MacroAir recommends marking or painting the floor with a large crosshatched circle to alert personnel of the overhead location of fans.

## **1.5 Sprinkler Systems and Fan Placement**

In any installation where fire sprinklers are in place, do not interfere with their correct operation. Fans should be located not less than 3 feet below a sprinkler, and placed central to each sprinkler quadrant.

Our standard variable-speed control system can be connected to a fire suppression control system, which will emergency-stop fans in case of fire. Prior to installing fans, review all codes applicable to sprinkler systems and fans to ensure code compliance. Refer to the wiring diagrams packaged inside the control panel for proper installation. If further advice is needed, you may contact our support staff. However, it is your sole responsibility to see that the installation is completed to code and that it is correct.

## **1.6 Locating Control Panels**

Each fan has its own motor control panel (MCP). A motor control panel must be mounted at least 5 feet outside maximum blade length, and within 25 feet of the fan. Make sure the lockable service disconnect located on the side of the MCP is within line of sight of the motor to comply with OSHA and local safety codes.

## **1.7 Connecting Fans to Remote Controls**

You may control one fan or many fans with a single remote control switch box (see illustration on page 26). The remote switch box should be located so that no more than 100 feet of cable (supplied) is required to connect it to the motor control panel. Fans may also be controlled with temperature control sensors and building automation systems. Contact technical support for more information on these options.

## **1.8 Shielded Motor Cable (For Variable Frequency Drives)**

To minimize electromagnetic interference and stray voltage, each MacroAir fan assembly includes 25 feet of shielded motor cable, cable glands, and a variable frequency drive with a built-in filter. The shielded motor cable connects the fan motor to the motor control panel. This system reduces the likelihood of broadcasting and receiving electronic noise which can interfere with radio and other sensitive equipment. Plus, this system cuts fan installation cost as conduit is not needed where shielded cable is used, per the NEC, article 336. For more regulatory information on electromagnetic interference (EMI) refer to page 25.

## **1.9 Check Federal, State, and Local Codes**

Check all relevant codes to make sure all product certifications, product listings, and building regulations are met. Code compliance is the responsibility of the installer.

## **2.0 General Mounting Considerations (I-Beam, Glulam Beam, or Other Type of Truss System)**

Each type of mounting system (I-beam, glulam, or other) requires a specific mounting bracket. Most are available from MacroAir. Before installing fans, check with the contractor, building owner, or architect to ensure the building structure is sound and will support the weight of the fan. MacroAir, provides guidelines for mounting fans; however, it is the sole responsibility of the building owner and installer to ensure the safety of the mounting system, that the building structure is sound, and that the installation complies with all federal, state, and local codes.

## 2.1 Weight

A standard 1-horsepower 24 foot 6-blade fan weighs about 240 pounds, including the standard mounting hardware. In inverted-blade applications designed to blow air upward (very unusual), there is an additional down force of about 100 pounds due to fan thrust. We recommend that a building structure be capable of holding approximately twice the stated hanging weight of the fan. If there is some doubt of this, a professional contractor or architect should perform a thorough evaluation of the building prior to purchasing fans.

## 2.2 Torque

The maximum torque (twisting force) that must be handled by the mounting system, including building structure, occurs at fan startup. For a 24 foot fan, maximum potential starting torque is 300 ft-lbs. When standard electrical controls are installed, the fan will never begin to approach this maximum because the standard variable-speed control system uses soft-start technology. However, should the soft-start fail, or when a fan is installed as a single-speed model without the variable speed control system (rare), full torque might be applied to the mounting system, so it is important that it be adequate to withstand 300 ft-lbs torque.

## 2.3 Safety Cable

A MacroAir fan should never be run without a properly installed safety cable, which is supplied with every fan along with all required hardware. You must install safety cable for warranty to be in effect.

## 2.4 Close Clearances

The area within three feet of the blade tips when the fan is at rest is considered "close clearance". It is EXTREMELY DANGEROUS to mount the fans within "close clearance" of any object. We strongly recommend not mounting the fan closer than 15% of its diameter to any object. If this is an issue, mounting extensions and smaller fans are available from MacroAir. Refer to the illustration "Fan Clearance and Extension Guide" on page 29.

## 2.5 Guy Cables

A running fan can sway due to a minor imbalance or because of wind. "Wind" may be only the air movement the fan itself generates, or it may be actual wind if the fan is mounted outdoors or in open areas. Since the mounting system is free swiveling, it will not stop fan movement, so it is imperative that guy wires be properly installed. The primary considerations are angle and tension of the guy wires. See Step 10 for more information.

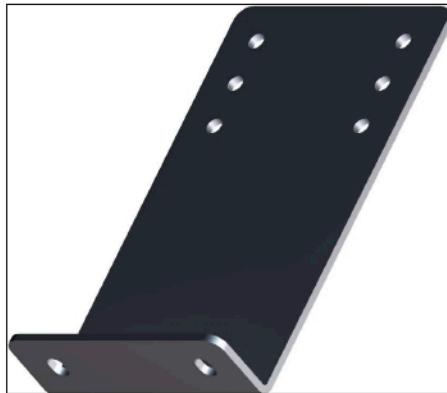
## 2.6 Guards (except standard eco6 fan with integral guard)

If there is potential for people or objects to come in contact with a running fan, it is best to construct a guard from angle iron and steel mesh, attaching it securely to the building structure. The guard should be mounted with sufficient clearance so that no part of it can be pushed into the fan, with at least 18 inches of clearance on all sides. We recommend 2" x 2" x 3/16" angle-iron for the frame, and, in most cases, 2" x 2" x 11-gage weldmesh (1/8" diameter wire on 2" centers) for the screen. However, mesh size should be dependent on what objects might come in contact with the fan — if, for example, employees on lifts can inadvertently get a finger into a fan, use smaller mesh or greater spacing — OSHA guidelines state that a finger guard must prevent a finger entering into the guard within four (4) inches of the moving device, the fan blades in this case. Refer to OSHA guidelines, paragraph 1910.212(a) (5) for more information.

## 2.7 Universal Mounting Hardware

We recommend mounting the fan to a horizontal structural beam, but this is not always possible in buildings with pitched roof construction. For that reason, our universal mount is designed to swivel freely in order to allow the fan to hang in a level position regardless of the angle of the beam it is mounted to. Our mounting hardware package includes clamps for use with standard steel I-beams, shims for thicker steel I-beams, and all necessary nuts and bolts. For buildings with glulam beams (laminated wood), an additional set of brackets, available from the factory, is required (see figure 1 below).

Fig 1

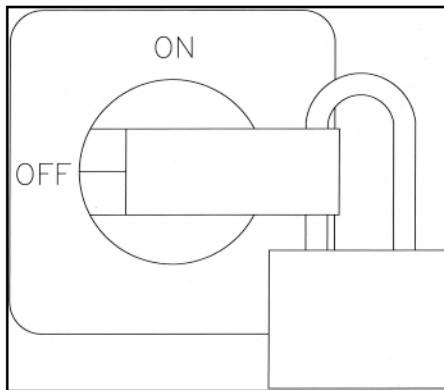


Our standard mounting hardware will accommodate steel I-beams up to 5/8" thick by 10 3/4" wide. The glulam bracket adapters will accommodate glulam beams up to 8" wide. Additional hardware for larger beams is available from the factory.

## 2.8 Maintenance

Before servicing the fan or control panel ensure all POWER IS OFF and locked out to avoid injury. See Figure 2 below.

Fig 2



### Control Panel

Occasional cleaning is advisable, especially when the panel is located in a dusty or dirty environment. A can of compressed air, like that used for computer cleaning, works well to clean the inside of the panel. Simply wipe down the outside of the enclosure with a cloth or duster periodically, if desired.

### Power Unit

The gearbox is lubed for life, and we use thread locking compound on critical nuts and bolts. However, it is a good idea to annually check that no nuts or bolts have vibrated loose. No other maintenance is required.

### **Mounting Hardware**

Check all mounting bolts annually to be sure they have not loosened. Also, check the safety cable and guy wires to be sure they are not loose or frayed. Loose guy wires are more likely to break than tight ones, and broken guy wires may fall into the fan. If a guy wire is loose, carefully check to be sure it is not damaged, and retighten it.

### **Blades**

Wipe any accumulated dust off all surfaces of the blades once a year. If needed, use a mild detergent solution. There is no need to remove the blades from the fan to perform this procedure.

## 2 Installation Procedures

### Step 1, Install mounting hardware

- A) For **glulam installations**, attach the glulam brackets to the beam using  $\frac{1}{2}$ " through bolts, not supplied. Note,  $\frac{1}{2}$ " lag screws, also not supplied, may be used as an alternative, but will not provide as much mounting strength. Be sure the brackets line up with each other and that the bottom of each bracket is flush with the bottom of the beam. For glulam installations, attach the mount directly to the bracket using the supplied  $\frac{1}{2}$ " x  $2\frac{3}{4}$ " bolts, washers, and nylon lock nuts. See Figure 3 below.



Fig 3

- B) For **steel I-Beam installations**, mount so that the large plate is against the bottom of the beam. Be sure the plate is at a 90 degree angle to the beam and centered. Place the supplied clamps on top of the beam and attach them to the mount using the supplied fasteners. For thicker I-beams, use the supplied shims between the clamp and the mount as shown in figure 4.

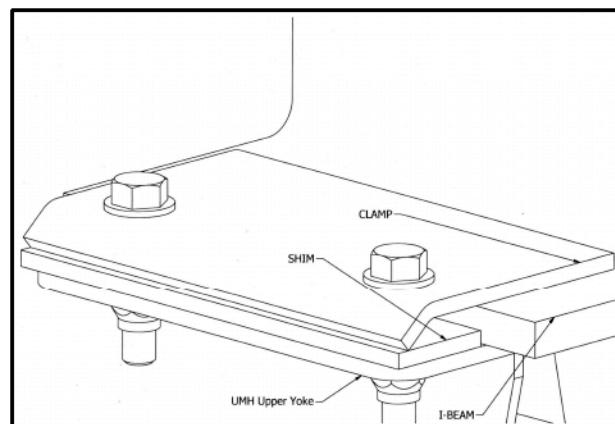


Fig 4

**Note:** In all cases, be sure to thoroughly tighten all mounting bolts and nuts. The nylon lock nuts help prevent loosening due to vibration, but there is no substitute for proper tightening. We recommend that nylon lock nuts not be removed and reused because this will defeat the nylon locking; instead, buy new nylon lock nuts from your local hardware store.

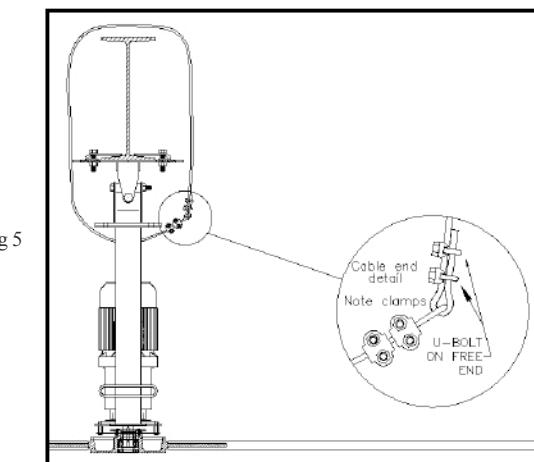
- C) If an extension is to be used, attach it to the bottom of the universal mount using the fasteners provided with the extension. Also, be sure to save the longer safety cable and guy wire supplied with the extension; they will be needed in later steps.
- D) Loop supplied safety cable (1/4 inch steel braided cable) over the beam and let it hang. It will be attached once the power unit is installed. If using an extension, be sure to use the longer safety cable supplied with the extension.

## Step 2, Attach Power Unit To Mounting Hardware

- A) We recommend using a scissor lift to install our fans. The best method is to place the power unit hub-down on the lift and raise the lift until the power unit frame touches the bottom of the universal mount or extension (if used).
- B) Once the motor frame is in contact with the mount/extension, maneuver the power unit as necessary to line up the mounting holes.
- C) Securely attach the power unit to the mount/extension using the  $\frac{1}{2}$ " x  $1\frac{1}{2}$ " bolts, washers, and nylon lock nuts included in the mounting hardware kit. Be sure to thoroughly tighten all four bolts and nylon lock nuts to prevent vibration-related loosening. Correct tightening is extremely important. Again, do not re-use nylon lock nuts.

## Step 3, Attach Safety Cable

Refer to figure 5 as necessary. **This step is required, omitting it will void manufacturer's warranty!**



- A) Slide two of the supplied large cable clamps over each end of the safety cable.
- B) Make a loop in one end of the cable, sliding the end back through the cable clamps.
- C) Feed the other end of the safety cable through the loop, making sure that the cable goes through the motor frame.
- D) Repeat step B for this end of the cable.
- E) Tighten the clamps securely, making sure that the u-bolts are over the free end of the cable, see Figure 5.

## Step 4, Mount The Motor Control Panel

Select a location for the MCP (Motor Control Panel) and mount securely.

- A) The MCP should be mounted so that no more than 25 feet of motor cable is required to connect it to the fan motor. Mount it in the upright position, vertically, with the door opening to the left. ***Do not mount*** so that the door opens downward. The mounting surface must be non-flammable, away from sources of heat, dust, moisture, and vibration.

- B) The MCP should be mounted at least 5 feet outside of the swept area of the fan blades; this will allow safe operation of the fan and still provide access to the MCP when the fan is running.
- C) Be sure to keep the lockable service disconnect located on the side of the MCP within line of sight of the fan motor to comply with OSHA and local safety codes.
- D) Mount the MCP, making sure the enclosure is firmly fixed to the mounting surface.

## Step 5, Mount Remote Switchbox

Select a location for the remote switchbox and mount securely.

- A) The remote switchbox should be mounted so that no more than 100 feet of remote cable is required to connect it to the MCP.
- B) Mount the remote switchbox in a location that is easily accessible for personnel authorized to operate the fan.
- C) Locate the switchbox in an area where it will be safe from damage caused by unintended contact.
- D) Securely mount the remote enclosure, making sure it cannot be easily detached by incidental contact.

## Step 6, Make Control Circuit Connections

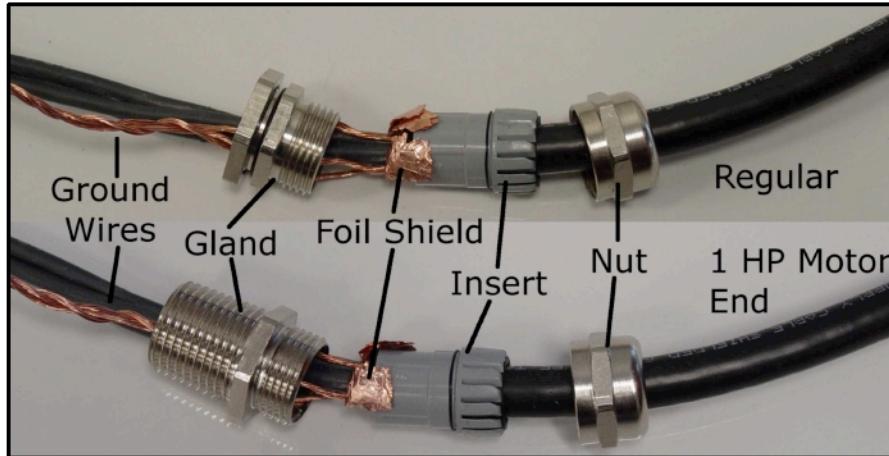
- A) Strip cable and conductors at both ends.
- B) Install one supplied strain relief fitting in the remote switchbox and make appropriate connections, referring to the control panel schematic packaged inside the MCP, the illustration on page 28, and/or the sticker inside the remote enclosure as needed. Close up the remote enclosure.
- C) Install the other supplied strain relief fitting in the MCP enclosure and make control circuit connections at the terminal strip of the VFD located inside the MCP, again referring to the packaged control panel schematic and the illustration on page 28. Do not make any incoming power or motor lead connections at this time.
- D) Ground the shield of the control circuit cable to the ground screw located in the lower left corner of the VFD next to the MAINS terminal.
- E) Daisy chain additional controllers if used, referring to the packaged control panel schematic. Ground the shielding of the cable at the slave controller side only. There is no need to specifically designate a "Master" drive — any drive may be used as either a master or slave with no changes. If interfacing with any kind of automated building management system, however, please consult factory as there may be additional programming required.
- F) Route the control circuit cables away from all incoming power and motor cables, keeping them separated by at least 6 inches. When control circuit wiring must cross power cables, make sure they do so at 90 degree angles to minimize interference.

## Step 7, Make Motor Lead Connections

- A) Verify controller voltage; this can be found on the lower left corner of the MCP's door, as well as the sticker on the side of the VFD (see "input").
- B) ***Use only the supplied motor cable for motor leads***, and be sure to attach all four wires — three for power, one for ground. The 25 foot cable is recommended to prevent voltage and frequency fluctuations, which could cause the motor to malfunction and/or be damaged. Consult the factory if a longer cable is required.
- C) Route motor cable away from all other power and control cables. Keep motor cable at least 6 inches away from input power and control wiring. If the motor cable must cross power cables or other motor control cables, make sure they do so at 90 degree angles to minimize interference. Avoid long parallel runs to prevent signal crossover.
- D) Correctly install supplied cable glands at both ends of the motor cable (see Figure 6).

**Note:** For all fans, one cable gland will be attached to the motor cable. For 1 HP fans, the second will be threaded into the motor J-box; for all other models, it will be attached to the power unit with a cable tie.

Fig 6



- i) Take the cable gland apart and slide the gland nut over the end of the cable, threads facing the cable end.
- ii) Slide the plastic and rubber cable gland insert over the end of the cable, with the larger end toward the middle of the cable.
- iii) Strip the outer insulation of the cable back approximately three inches, leaving approximately half an inch of copper foil sticking out past the outer insulation.
- iv) Slide the cable gland insert up the cable until it is flush with the outer insulation.
- v) Peel the foil shield back and fold it down over the cable gland insert. You may need to carefully make 2 or 3 cuts in the foil so it will fold back.
- vi) Slide the threaded part of the cable gland over the end of the cable, long side down. Work it down over the insert until only the "fingers" of the insert are visible, turning either piece as necessary to ensure a proper fit.
- vii) Slide the gland nut up and tighten it securely onto the gland.

- E) Twist the three uninsulated stranded copper ground wires together (see figure 7) and connect them to the green ground screw located inside of the motor junction box.

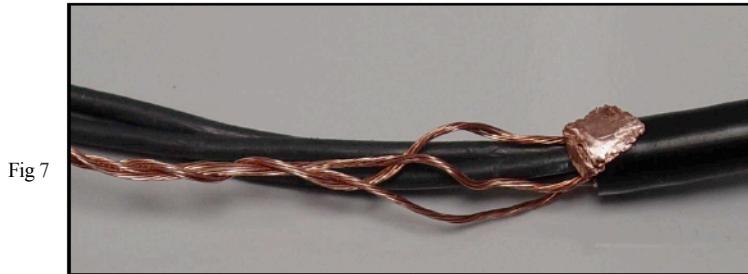


Fig 7

- F) Wire motor leads for the appropriate voltage, referring to the wiring diagram on the motor's information label/plate or to Figure 8. Note that the top four diagrams are for U.S. motors, while the bottom two are for CE motors, usually for use outside the U.S. Be certain to wire the motor for the correct voltage — a mistake here can ruin the motor and/or the VFD and is not covered under the factory warranty.

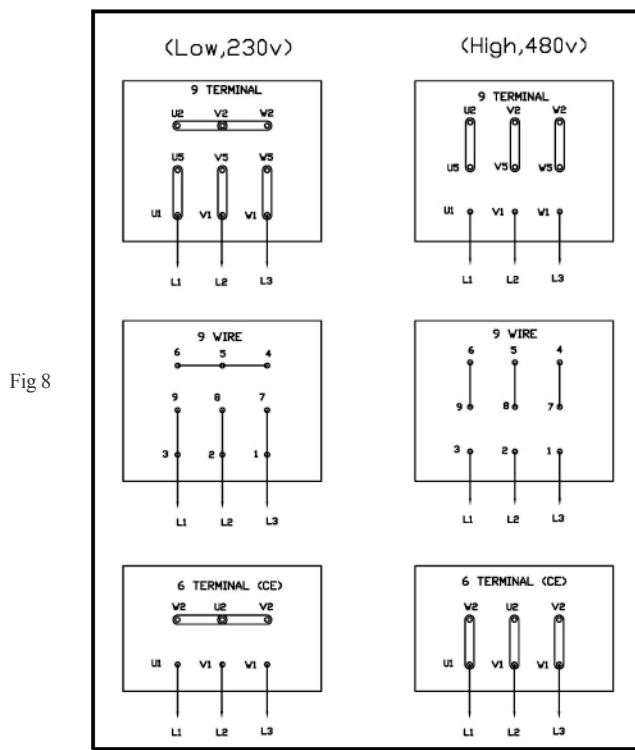


Fig 8

- G) At the other end of the cable, twist the three uninsulated stranded copper ground wires together (see figure 7) and connect them to the ground bar located inside of the Control Panel.

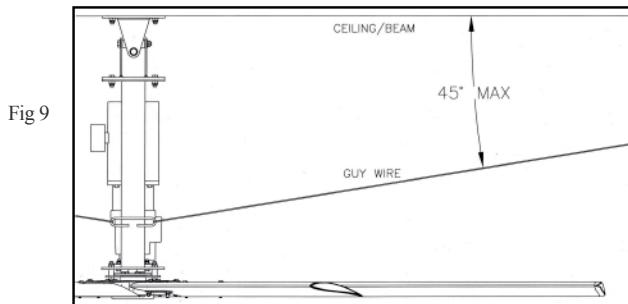
**Note:** *ALWAYS connect the ground wire of the included motor cable at both ends, MCP and motor.*

- H) Connect motor leads to terminals U, V, & W on the VFD. ***Do not attach these leads to the disconnect switch!***

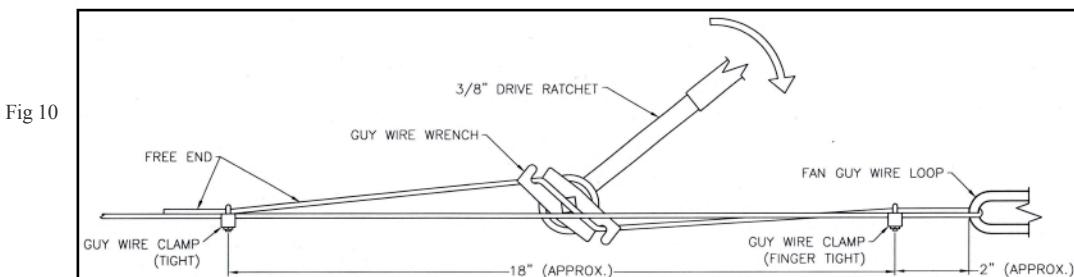
## Step 8, Install Guy Wires

If an extension is installed, be sure to use the longer guy wires packaged with it. Be sure to use four guy wires, with two clamps per end (four per guy wire). Keep the angle formed by the guy wire and the ceiling less than 45 degrees. If longer guy wire is required, it is available inexpensively at most hardware stores. Eye bolts (not supplied) are recommended to attach the wires to the building structure.

**Note: This step is REQUIRED — omitting it may void manufacturer's warranty!**



- A) Be sure to avoid any sharp corners to avoid fatiguing and fraying of the guy cables.
- B) Attach the guy wires to the building structure.
  - i) Slide two of the supplied small cable clamps over one end of the wire.
  - ii) Feed that end of the wire through the eye bolt (not supplied) and back through the cable clamps.
  - iii) Tighten the cable clamps securely, keeping the u-bolt side over the free end of the cable — see figure 10 below.
- C) Attach the guy wires to the loops on the lower section of the fan, one wire per individual loop.
  - i) Slide two of the supplied small cable clamps over the near end of the wire.
  - ii) Feed that end of the wire through the guy wire loop on the fan and back through the clamps, taking all the slack out of the cable.
  - iii) Slide one clamp as close to 18 inches as possible from the fan and tighten it securely — it needs to hold the free end of the wire in place during the tensioning process.
  - iv) Position the other clamp about two inches from the fan and tighten it just far enough to hold it in place.
  - v) Remove the rest of the slack, one guy wire at a time, using the included guy wire wrench (see Figure 10 below). It is advisable to put a level on the hub to be sure the fan remains horizontal.

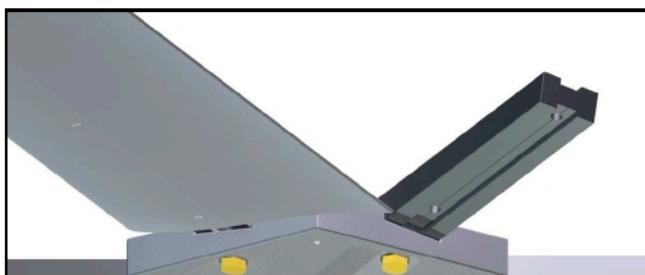


- 1) Attach the tool to a 3/8 inch drive ratchet.
  - 2) Loop the tool through the free end of the guy wire between the clamps and turn clockwise as far as possible.
  - 3) Tighten the inner clamp to hold the tension.
  - 4) Repeat until all excess slack is out of the wire.
- vi) Loosen the outer cable clamps, pull the slack out of the free end of the wire, and position the clamp about 18 inches from the inner one.
- vii) Re-tighten the outer clamp and double-check that the inner clamp is tight. Be sure the u-bolt is over the free end of the wire to prevent slipping.
- viii) Repeat for all guy wires.
- ix) Re-check all clamps for tightness.

## Step 9, Install Fan Blades and Blade Safety Links

- A) Install the fan blades.
- i) Blades should curve toward the floor (thin edge down) when correctly installed. Whisperfoil XL blades (our standard blades) use a black extruded-aluminum blade strut that will only allow the blade to be attached in one direction. This blade strut has an index line in the center of one side, which should face the direction of airflow (usually down).  
Whisperfoil and Wickerbill blades use a flat steel blade strut that does not restrict the direction the blade can be installed. Extra attention to blade direction is required when installing these types of blades.

Fig 11

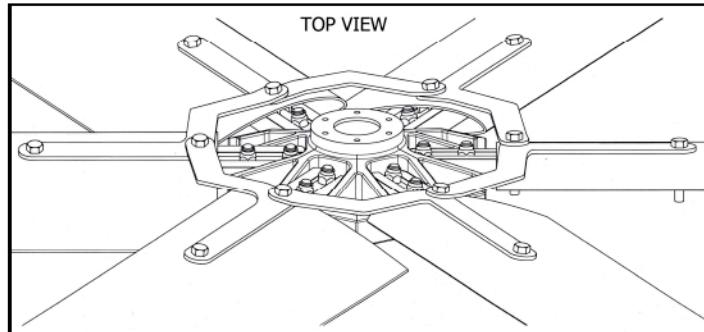


(If you are installing an inverted-blade fan (rare), the blades should curve **away** from the floor. ONLY install the blades in this direction if you want the fan to blow air up. Unless ordered from the factory as an inverted-blade fan, the blade holders will need to be reversed for this; consult the factory before doing so.)

- ii) Slide one blade over any blade holder. For Whisperfoil XL blades, be sure the index line of the blade holder faces down (up for inverted applications). For Whisperfoil or Wickerbill blades, be sure the blade curves downward.
- iii) Line up the bolt holes in the blade with the holes in the blade holder.
- iv) Repeat for each blade.

- B) Install extended blade safety links . **This step is REQUIRED — omitting it will void manufacturer's warranty!**

Fig 12



- i) On top of one blade, place a safety link, so the long leg lines up with the holes in the blade. Put a bolt through the outer blade hole just to hold the link in place — don't put a nut on it at this point, though.
  - ii) On top of the next blade, place a second safety link so that the short end is on top of the previous safety link. (See Figure 2 above).
  - iii) Line up the inner hole of the blade with the holes in both safety links. Put a bolt through each of the holes on this blade.
  - iv) Securely tighten an included nylon lock nut onto each of the bolts, using an included flat washer between the nut and the blade. The safety link will bend when the nut closest to the hub is tightened due to the angle of the blade struts.
  - v) Repeat for the rest of the blades.
  - vi) Once the starting point is reached, slide the final safety link between the short end of the first safety link and the blade. Follow steps iii and iv to attach like the rest.
- C) Check that all bolts are tightened firmly — blade bolts require 23 ft-lbs of torque. Blades should not rattle when the fan is running.

## Step 10, Check Clearances And Guy Wire Tension For Safety

- A) Rotate the fan slowly one time by hand to find the position and blade with the least clearance from any possible obstructions. If necessary, reposition the fan to prevent any dangerous conditions.

**Note: At rest, the blade tips droop lower than they will be in operation due to gravity. For our largest fans, this deflection can be approximately one foot.**

- B) Double check guy wire tension by attempting to move the fan in any horizontal direction and by trying to pull down on the guy wires. They should be very difficult to move. If there is visible slack in any guy wire or if any moves easily, re-tension them before proceeding.

## Step 11, Install Guards If Necessary

Refer to Section 2.6 on page 10 for guidelines.

## Step 12, Install Input Power

- A) Verify that input power voltage and number of phases match that of the MCP.
- B) Determine the appropriate size for the input circuit by multiplying the maximum input amperage of the VFD — found on the door of the MCP and on the included control panel schematic (wiring diagram) — by the number of fans to be placed on the circuit. Be sure the breakers used match the voltage of the VFD. Each MCP contains input fuses providing individual circuit protection for each unit, but an appropriately-sized input breaker must still be installed.
- C) Connect a ground wire from the supply panel to the ground bar located inside of MCP.

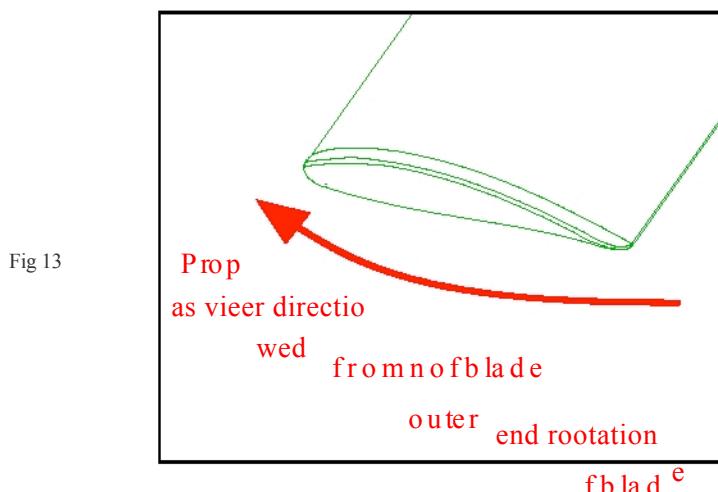
**Note:** *ALWAYS connect the grounding bar in the MCP to ground at the power panel — when pulling power from the main panel, be sure to pull a full sized ground.*

- D) Connect input power leads to the proper terminals of the disconnect switch located on the side of the MCP. **Do not connect these wires directly to the VFD!**

## Step 13, Verify Proper Operation

Leave the door of the MCP open during this process so the front of the VFD is visible.

- A) Turn the service disconnect to the On position. When power is applied, the green On indicator (located on the front of the VFD) will light.
- B) Adjust the speed control knob (located on the remote switchbox) to 4.
- C) Turn the For-Off-Rev (Forward/ Off/ Reverse) switch (located on the remote switchbox) to the For (Forward) position.
- D) After a 15 second delay, the fan will begin to accelerate slowly.
- E) Verify proper rotation with the For-Off-Rev switch in the For position: the rotor should be turning in the counter-clockwise direction when viewed from the floor — see figure 13.



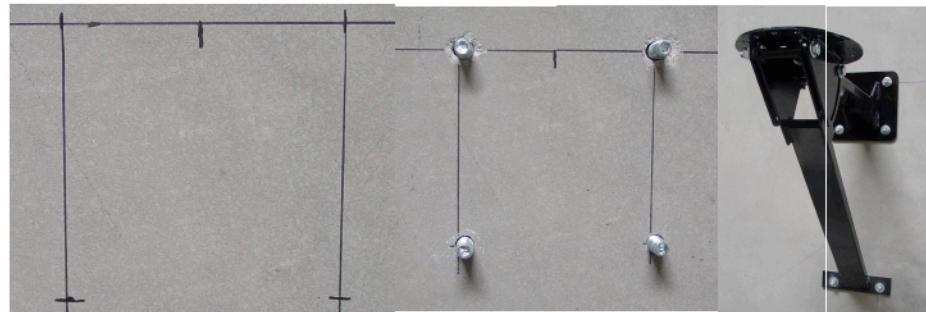
- F) If the fan is turning the wrong way on initial startup, follow the procedure below:
  - i) Verify that the For-Off-Rev switch is in the For position.
  - ii) If so, turn the switch to the Off position.
  - iii) Carefully remove the remote switch box faceplate with the switches attached and turn it over. Verify that the wiring to the For-Off-Rev switch matches the wiring diagram (there should be a sticker inside the remote enclosure). If it's wrong, correct it and re-test the fan. Reattach the faceplate (before testing).
  - iv) If step iii does not solve the problem, turn off the disconnect switch on the MCP and snap the small cover off the VFD. Ensure that the wiring matches the wiring diagram — this can be found on the included control panel drawing as well as on a sticker inside the control panel door. If this wiring is wrong, correct it, replace the cover, and test the fan again.
  - v) If step iv does not solve the problem, simply switch any two of the three power wires from the MCP to the fan motor, either at the MCP or at the motor. Turn the power back on and re-test the fan.
  - vi) If none of these steps fix the problem (extremely unlikely,) contact the factory for further assistance.
  - vii) Be sure the remote box is re-assembled and the cover is back on the VFD before proceeding.
- G) Adjust the speed control to 9 and verify full speed operation with no Fault or Warning indicators lit on the VFD. Contact factory if fault/warning condition occurs.
- H) Close up the MCP.
- I) Adjust fan speed and direction for desired operation.

### 3 Installation Procedures For eco6 Guard Fan

#### Step 1, Install Mounting Assembly

##### For Wall-Mounted Applications

Fig 14



- A) Mark a level line on the wall at the desired mounting height to locate the top edge of the upper mount plate.
- B) Use the mount as a template to carefully mark the locations of the mounting holes on the wall. There should be six holes total: four in the upper plate and two in the lower plate. Be sure to align the top edge of the upper mount plate with your level line.
- C) Remove the mount from the wall and pre-drill mounting holes for the appropriate mounting fasteners.
- D) Attach the pre-assembled mount/pivot unit to the wall.

##### For concrete or masonry walls:

- i) Insert Red Head or equivalent 1/2" self-anchoring studs (not included) into the mounting holes, properly securing them according to manufacturer's instructions.
- ii) Slide the mount plates over the studs and attach using nylon lock nuts and flat washers, being careful not to over-tighten.

**Note:** *We recommend that nylon lock nuts not be removed and reused because this will defeat the nylon locking; instead, buy new nylon lock nuts from your local hardware store.*

##### For wood surfaces (wood studs): *Before mounting the fan to a wood surface, ensure that the structure will safely support the fan's weight (see spec. sheet).*

- i) Line the mount assembly up with the mounting holes.
- ii) Insert 1/2" lag bolts (not included) into the holes, using washers to maximize the hold. Be sure that you use bolts long enough to support the weight of the fan. Tighten the bolts securely, but do not over-tighten them.

## For Pole-Mounted Applications



Fig 15

- A) Cut and mount bracketing.
  - i) Cut and assemble UniStrut or equivalent bracketing (not included). Use the mount assembly as a template for length and hole spacing.
  - ii) Securely attach the brackets to the pole at the desired height. Be sure that all strap bolts are firmly tightened and that the vertical spacing is correct.
- B) Attach the fan to the bracketing.
  - i) Insert 1/2" bolts with 1 washer each into the brackets.
  - ii) Slide the mount assembly over the bolts and attach using nylon lock nuts and flat washers.

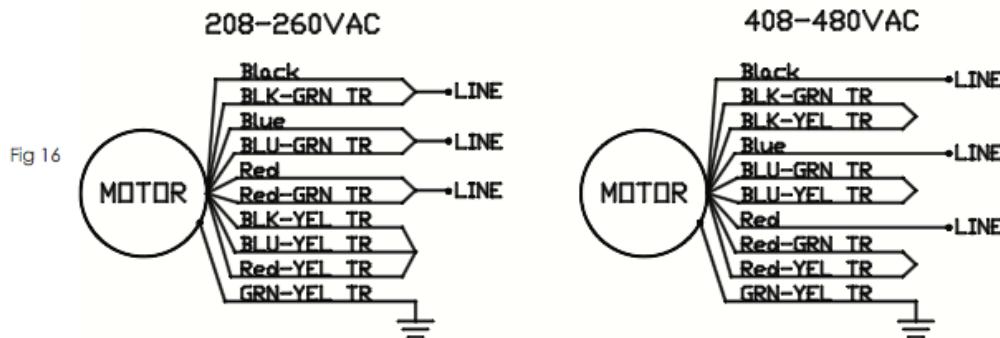
## Step 2, Attach Motor Assembly To Mounting Assembly

- A) Place the motor assembly on the mounting assembly, making sure the mount assembly pivot section is flat.
- B) Rotate the motor assembly to approximately the desired horizontal angle. **Make sure to leave enough room to use at least three (3) mounting bolts to attach the motor assembly to the mounting assembly.**
- C) Insert supplied 1/2" mounting bolts and washers downward through holes. Securely tighten the provided nylon lock nuts, using washers to maximize hold. Four mount bolts are best, but **at least three (3) mounting bolts must be used.**

## Step 3, Make Control And Motor Cable Connections

- A) For variable-speed fans, set up the Motor Control Panel and Remote Switchbox according to the instructions found in Step 4 through Step 7 of the regular instructions (pages 12 through 15).
- B) For single-speed fans, wire up the included circuit breaker/starter according to the instructions printed on the inside of the box.

- C) For either fan, use the wiring diagrams in figure 16 to make the proper connections at the motor.



For eco6 Guard Fans without Safety Screens, skip Step 4.

#### Step 4, Attach Rear Safety Screen

If ordered, safety screens MUST be installed to prevent injury in the unlikely event of shaft failure.

Fig 17



Fig 18

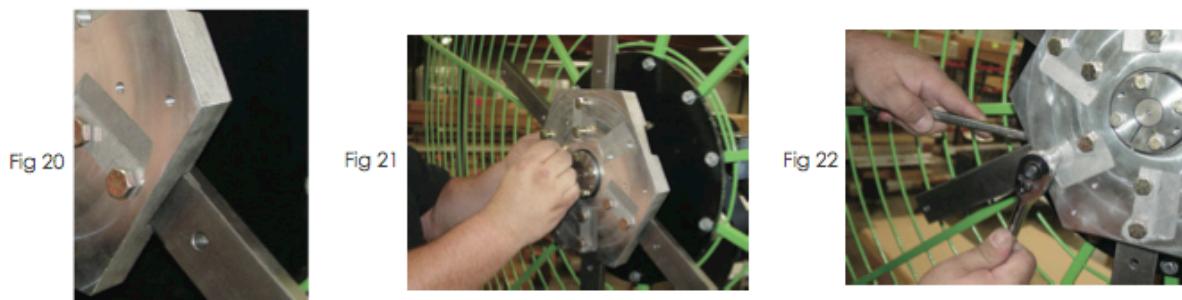


Fig 19



- A) From the front of the fan, maneuver the rear screen over the hub and motor plate to the rear, as shown in Figures 17, 18, and 19 above. Be sure the wire of the safety screen is on the opposite side of the struts from the mount plate.
- B) Line up the holes in the screen struts with the holes in the motor mount plate.
- C) Securely attach the screen to the motor mount plate using the supplied bolts, washers, and nylon lock nuts, being sure to put the bolts in from the front. Refer to Figure 19 above.

## Step 5, Attach Solid Steel Blade Struts



- A) Slide one blade strut into any notch in the hub, chamfered (beveled edge) side facing you, radiused end towards the center of the hub. See figure 20.
- B) Insert two gold-colored 3/8" x 1 3/4" bolts (supplied) through the holes in the hub and blade strut. Finger-tighten one gold-colored 3/8" nylon lock nut (supplied) onto each bolt.
- C) Repeat steps 5A and 5B for all 6 blade holders. Refer to Figures 20 & 21 as needed.
- D) Securely tighten all 12 bolts as shown in Figure 22. Torque each to 45 ft-lbs.

## Step 6, Attach Fan Blades and Hub Cover



**For fans without safety screens, blade safety links and safety link extenders must be installed. See step 9B in the standard Installation Supplement for more information on how to install these.**

- A) Slide one blade over any blade strut, ensuring that the hooked edge of the blade faces you. See Figures 23 and 24.
- B) Line up the holes in the blade with the holes in the blade strut and insert the supplied bolts from back to front (towards you), as shown in Figure 23. Use a washer between the bolt head and the blade.
- C) Attach the supplied nylon lock nuts to the bolts, using washers between the nut and the blade, and tighten firmly — blade bolts require 23 ft-lbs of torque. See Figure 24.
- D) Repeat steps 6A, 6B, and 6C for all 6 fan blades. Refer to Figures 23 and 24 as needed.
- E) Attach the black plastic hub cover to the hub using 3 supplied Phillips screws and star washers. The blade strut bolts may need to be turned slightly to allow the hub cover to snap between them.

## Step 7, Attach Front Safety Screen (if ordered with safety screens)

- A) Line up the struts of the front screen with the struts of the rear screen.
- B) Attach the screens together by inserting the included sheet metal screws through the holes in the front screen struts into the holes in the ends of the rear screen struts.
- C) Completely tighten one screw at the top, bottom, and each side to hold the screens in place, then tighten all the screws. Be careful not to strip them out.

## Step 8, Make Final Adjustments And Attach Safety Cable

- A) Fine-tune the horizontal angle. Make sure the nuts are all completely tight.
- B) Pivot the fan to the desired vertical angle and securely tighten all the nuts in the pivot section.

**Always allow one to two inches of clearance between the safety screen and walls or ceiling.**

- C) Check that all nuts and bolts are completely tight.
- D) Thread the safety cable through the center hole on the motor mount and pivot below the gearbox/motor and attach securely to a nearby wall or ceiling. Follow the directions in step 12 of the standard instructions to properly secure the cable. MacroAir recommends using an eyebolt securely attached to the wall or ceiling to anchor the safety cable; this is not included with the fan.



## Regulatory Notice

### EMI | Electromagnetic Interference

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of radio navigation or other safety services or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pagers, and personal communications services (PCS). These licensed services, along with unintentional radiators such as digital devices, variable frequency drives (VFDs), and other equipment such as fans with VFDs, contribute to the electromagnetic environment.

Electromagnetic compatibility is the ability of items of electronic equipment to function properly together in the electronic environment. MacroAir Fans with variable frequency drives, VFDs, are designed to be in compliance with regulatory agency limits for EMI. However, there is no guarantee that interference will not occur in a particular installation. If MacroAir products (fans) do cause interference with radio communications services, which can be determined by turning the fans off and on, please notify MacroAir technical support.

MacroAir Technologies products are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

Class A is typically for business or industrial environment.

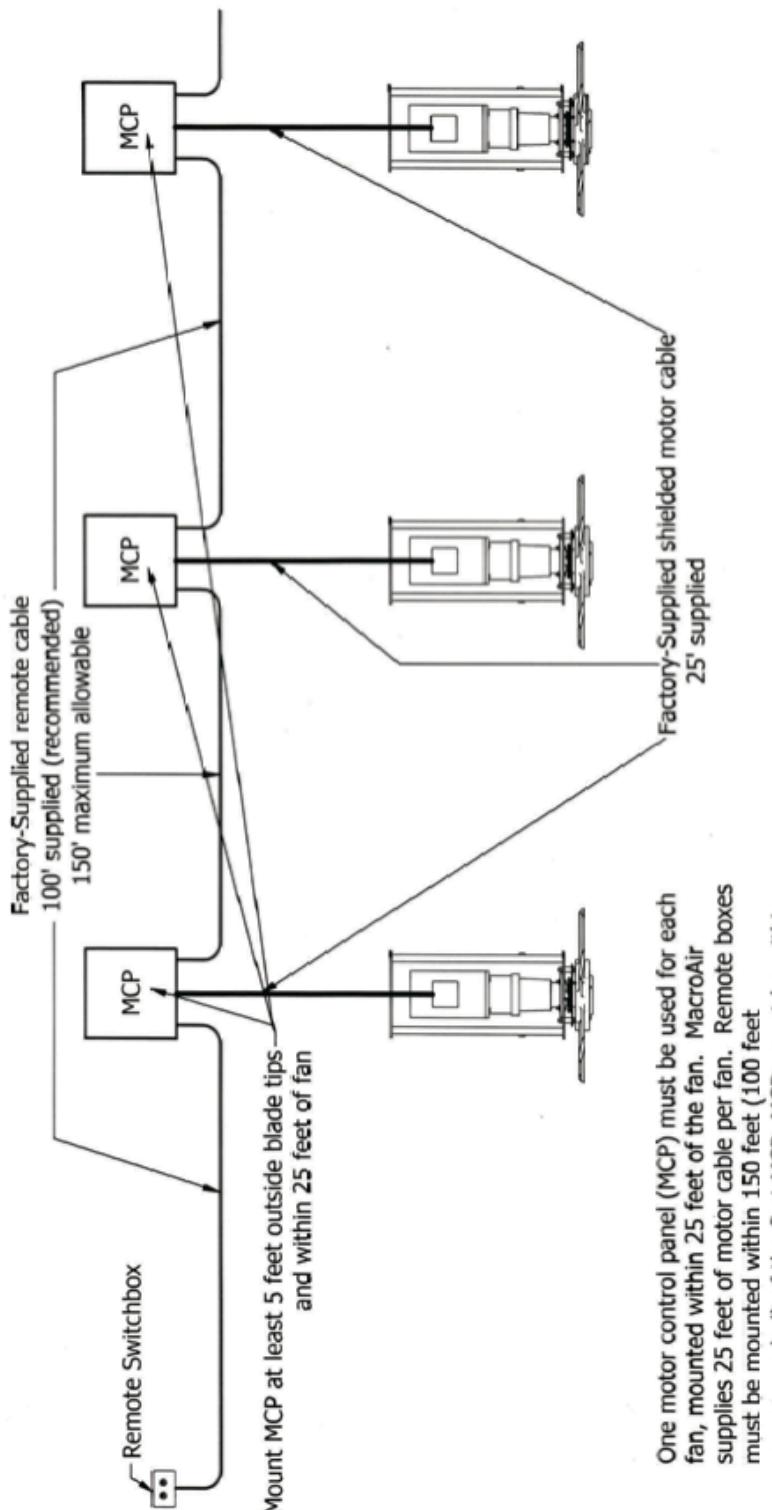
Class B (MacroAir products are **NOT** designed for typical residential environments covered under this classification.)

**CODE COMPLIANCE IS THE RESPONSIBILITY OF THE INSTALLER AND, ULTIMATELY, THE END USER.** All wiring should conform to the National Electric Code (NEC) 2005, ANSI/NFPA 70-1999, and all local codes. This fan control should only be installed by qualified technicians familiar with the requirements of the NEC and local codes.

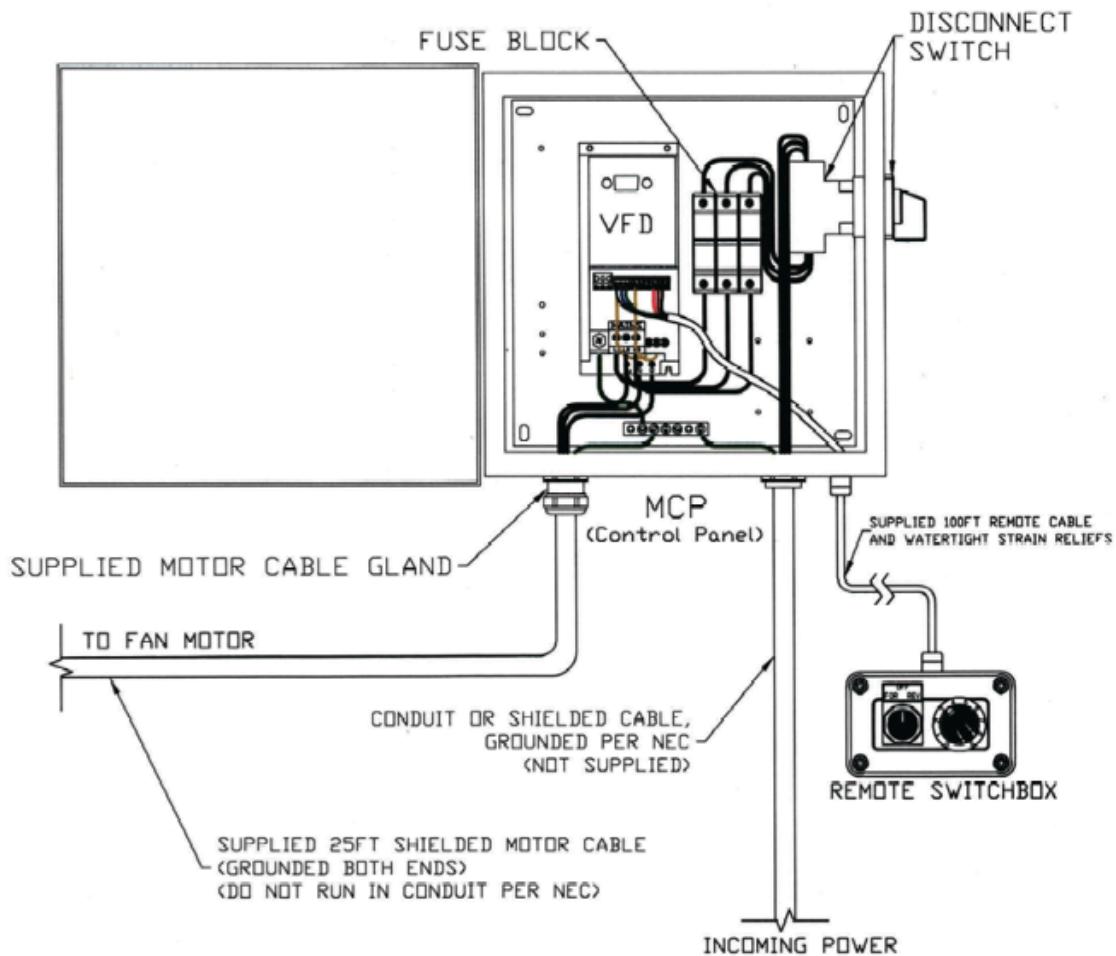
***Note: MacroAir Technologies has a policy of continuous product improvement and reserves the right to change design and specifications without notice.***

Thank you for selecting The Original Big Fans from MacroAir Technologies. If you have any questions please call technical support at 866.668.3247. We are happy to assist you.

## Multiple Fan Wiring Diagram



## Motor Control Panel Assembly and Wiring Illustration

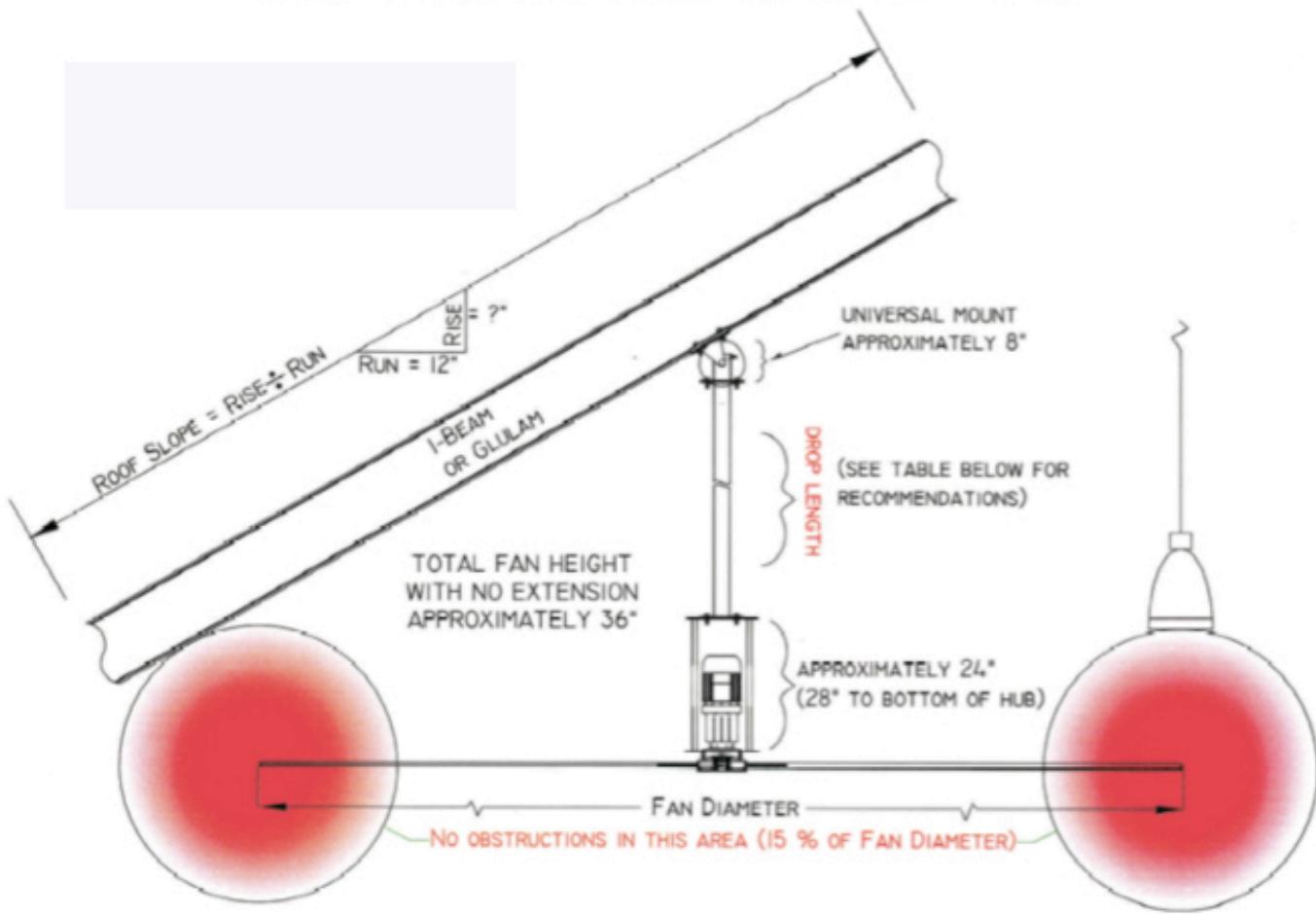


### NOTES

1. FAN SHOULD ONLY BE INSTALLED BY QUALIFIED PERSONNEL IN ACCORDANCE WITH THE NEC.
2. PROPER GROUNDING OF PANEL AND FAN PER THE NEC IS REQUIRED FOR SAFETY AND PROPER OPERATION.
3. REMOTE SWITCHBOX, REMOTE CABLE, MOTOR CABLE, AND MOTOR CABLE GLANDS SUPPLIED BY MACROAIR.
4. LENGTH OF CABLE FROM DRIVE TO MOTOR TO BE 25 FEET OR LESS.
5. THIS PAGE IS FOR ILLUSTRATION PURPOSES ONLY. FOR ALL INSTALLATIONS, REFER TO THE CONTROL PANEL SCHEMATIC PACKAGED INSIDE THE MCP.

**WARNING: MOTOR CABLES AND INCOMING POWER MUST NEVER BE RUN IN THE SAME CONDUIT. FAILURE TO INSTALL PER MACROAIR INSTRUCTIONS, INCLUDING WIRING, MAY BE HAZARDOUS, CAUSE PREMATURE FAILURE, AND VOID THE MANUFACTURER'S WARRANTY.**

## FAN CLEARANCE AND EXTENSION GUIDE



SLOPE (in)	2/12	4/12	6/12	8/12	10/12	
ROOF ANGLE	9.5 degrees	18.4 degrees	26.6 degrees	33.7 degrees	39.8 degrees	
Fan Diameter (Ft.)	Recommended Extension Length					Clearance Zone Radius
6	N/A	N/A	N/A	N/A	1	11"
8	N/A	N/A	1	1	2	15"
10	N/A	1	1	2	3	18"
12	N/A	1	2	3	4	22"
14	1	2	3	4	5	26"
16	1	3	4	5	7	29"
18	2	3	5	6	8	33"
20	2	4	5	7	9	36"
24	3	5	7	9	11	44"

THE EXTENSION LENGTHS ABOVE ARE MINIMUM RECOMMENDATIONS ONLY, BASED SOLELY ON ROOF PITCH AND FAN DIAMETER. OTHER CONSIDERATIONS MUST BE EVALUATED WHEN DETERMINING EXTENSION REQUIREMENTS, SUCH AS PLACEMENT OF LIGHTS, SPRINKLER SYSTEMS, HVAC SYSTEMS, AND SO ON. IN ADDITION, OSHA REQUIREMENTS STATE THAT FAN BLADES MUST BE A MINIMUM OF 10 FEET (3.05 METERS) ABOVE THE FLOOR. CONTACT OUR SALES DEPARTMENT FOR ASSISTANCE WITH FAN PLACEMENT AND EXTENSION SELECTION.

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